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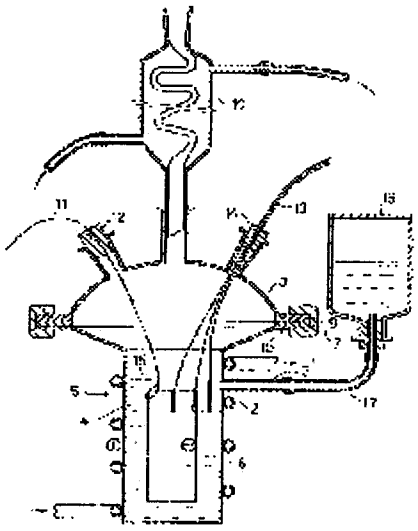
(54) REACTION TANK FOR ELECTROLYSIS

(57)Abstract:
PURPOSE: To rapidly take out the generated heat due to electrolytic reaction to the outter part and also to hold the liquid level and the concn. of an electrolyte constant by fitting a pipe for heat exchange around a cylindrical electrolyzer and joining a pipe for supplying a solvent.
CONSTITUTION: A pipe 2 for heat exchange is spirally fitted to a cylinder made of the material such as platinum. A pipe 3 for replenishing a solvent is joined to the upper position of the cylinder in order to hold the liquid level and the concn. of an electrolyte constant. Cooling water is allowed to flow through the pipe 2 and the pipe 3 for replenishing the solvent is connected to the pipe 2 so that heavy water 4 is replenished through the pipe 3. A reaction tank 5 for electrolysis is used as an anode and a rod like electrode 6 is used as a cathode. Even when heat is generated from heavy water 1. by electrolytic reaction, the pipe 2 is immediately cooled because cooling water is allowed to flow through the pipe 2. When heavy water 4 is slightly vaporized and reduced, heavy water 4 is replenished from the pipe 3 and therefore the liquid level 15 is held constant.



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1. Title of the Invention

REACTION BATH FOR ELECTROLYSIS

2. Claims

(1) A reaction bath for electrolysis wherein a heat exchange pipe for discharging heat generated during electrolysis to an outside is attached to a periphery of a cylindrical electrolytic bath and a solvent replenishing pipe for maintaining a liquid surface and an electrolyte concentration, which are reduced due to an electrolysis reaction, to be constant is connected.

(2) The reaction bath according to claim 1, wherein the bath is made of a metal material that is mainly composed of platinum, palladium, gold, silver, nickel or titanium.

(3) A structure of an electrolysis reaction bath wherein the cylindrical electrolytic bath of the reaction bath for electrolysis itself is an anodic or cathodic electrode.

3. Detailed Description of the Invention

[Filed of the Invention]

The invention relates to a reaction bath for electrolysis used when electrolyzing heavy water and a structure of an electrolysis reaction bath.

[Prior Art and Problems]

When electrolyzing heavy water, a cylindrical electrode and a rod-shaped

electrode as an opposite electrode are disposed at a center of an electrolytic bath made of glass, thereby carrying out an electrolysis reaction.

However, in such electrolytic bath, it is insufficient to discharge the heat generated during the electrolysis to an outside. In addition, in order to maintain a liquid surface of the electrolytic solution and an electrolyte concentration, the supply should be made while monitoring.

Further, it is necessary to immediately discharge the reaction heat to the outside in the electrolysis reaction of the heavy water. In addition, since the electrolysis reaction is carried out while the two electrodes are opposite to each other, it is required to carry out the reaction with minimum electrolytic solution.

[Object of the Invention]

The invention has been made to solve the above problems. An object of the invention is to provide an electrolytic bath for electrolysis, which is capable of immediately discharging the heat generated during the electrolysis to the outside, is provided with a solvent replenishing pipe for maintaining a liquid surface an electrolyte concentration to be constant and is made of a metal material, and a structure thereof.

[Means for Solving the Problems]

According to the invention, there is provided a reaction bath for electrolysis wherein a heat exchange pipe for discharging heat generated during electrolysis to an outside is attached to a periphery of a cylindrical electrolytic bath and a solvent replenishing pipe for maintaining a liquid surface an electrolyte concentration, which are reduced due to an electrolysis reaction, to be constant is connected, and wherein the

reaction bath is a metal material that is mainly composed of platinum, palladium, gold, silver, nickel or titanium. The electrolysis reaction bath is such structured that the cylindrical electrolytic bath of the reaction bath for electrolysis itself is an anodic or cathodic electrode.

Hereinafter, the invention will be specifically described with reference to embodiments. It should be noted that the invention is not limited to the embodiment.

(embodiments)

Fig. 1 is a sectional view of a reaction bath for electrolysis according to an embodiment of the invention.

A cylinder 1 (40ϕ) having a platinum bottom 1a of 0.5t thickness is attached with a heat exchange pipe 2 (6ϕ) in a spiral pattern, is provided with a supply port 2a for supplying cooling water and the like and a discharge port 2b and is bonded at an upper surface of the cylinder 1 with a flange 1b having a taper formed thereto.

In addition, as a solvent replenishment pipe 3 for maintaining a liquid surface and an electrolyte concentration to be constant, a pipe of 6ϕ is bonded to an upper part of the cylinder 1.

As shown in Fig. 2, the cylinder is structured to electrolyze the heavy water 4.

Using a reaction bath 5 for electrolysis of the invention, the cooling water is made to flow in the heat exchange pipe 2, and the solvent replenishment pipe 3 is connected so that the heavy water can be replenished therefrom. The reaction bath 5 is used as an anode and a palladium rod-shaped electrode 6 of 20ϕ is used as a cathode. A removable four-port cover 8 is fixed to the upper flange 1b of the reaction bath 5 with

a connection fitting 9, through a Teflon packing 7.

In the mean time, one of the four ports of the removable cover is connected with a serpentine pipe cooler 10, another port is fitted with a stopper 12 of silicon rubber that fixes a conduction line 11 bonded to the palladium cathode 5 and the other two ports are fitted with stoppers 14 of silicon rubber that fixes conduction lines 13 for measuring a temperature.

With the structure, even when the heavy water 4 generates the heat through the electrolysis reaction, it is immediately cooled because the cooling water flows in the heat exchange pipe 2. When the heavy water 4 is reduced as the heat is generated a little, the heavy water 4 is supplied from the solvent replenishment pipe 3, so that the liquid surface 15 is maintained constant.

Furthermore, since the reaction bath 5 is used as a cathode, an insulating rubber pipe is used so as to supply the cooling water to the heat exchange pipe 2 and the solvent replenishment pipe 3 and a pin 16, in which the heavy water 4 is introduced, are connected with a Teflon pipe 17.

[Effect of the Invention]

As described above, according to the invention, it is possible to immediately discharge the heat generated during the electrolysis to the outside. In addition, since the solvent is timely replenished from the replenishment pipe, the liquid surface and the electrolyte concentration are maintained constant. Further, since the reaction tank itself can be used as an anodic or cathodic electrode, it is possible to obtain an effect that is totally different from the conventional electrode structure.

4. Brief Description of the Drawings

Fig. 1 is a sectional view of a reaction bath for electrolysis according to an embodiment of the invention, and

Fig. 2 is a sectional view showing an action example of a reaction bath for electrolysis.

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審査請求　未請求　請求項の数 3　（全3頁）

㊹発明の名称　電気分解用反応槽

㉑特　願　平2－229591
㉒出　願　平2(1990)8月31日

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明　細　書

1．発明の名称

電気分解用反応槽

2．特許請求の範囲

（1）電解中に発生する熱を外部に取り出すための熱交換用パイプが円筒状電解槽の周囲に取付てあり、且つ電解反応により減少する溶液の液面及び電解質濃度を一定に保つための溶媒補充用管が接合されて成る電気分解用反応槽。

（2）白金、パラジウム、金、銀、ニッケルまたはチタンを主体とする金属材料で構成した請求項1に記載の電気分解用反応槽。

（3）前記電気分解用反応槽の円筒状電解槽自体を陽極または陰極電極とすることを特徴とする電解反応槽の構成。

3．発明の詳細な説明

（産業上の利用分野）

本発明は、重水等を電気分解する際の電気分解用反応槽と電解反応槽の構成に関するものである。

（従来技術とその問題点）

従来、重水等を電気分解するのに、ガラス製等の電解槽に円筒状の電極とその対極として棒状の電極を中心に配し、電解反応を行っていた。

しかし、このような電解槽では電解反応で発生する熱を外部に取り出すことが十分でなく、また電解液の液面および電解質濃度を一定に保つためには、監視しながら供給する必要があるという欠点があった。

さらに、重水の電解反応では反応熱を外部へただちに取り出すことが必要であり、また、その電解反応は両極が対向している間で行われるため、必要最小限の電解液とすることが望まれていた。

（発明の目的）

本発明は、上記従来の欠点を解消するために成されたもので、電解反応による発生した熱を速やかに外部へ取り出すことができ、しかも電解液の液面及び電解質濃度を一定に保つための溶媒補給用管を設け、さらに、該電解槽を金属材料で構成した電気分解用反応槽とその構成を提供することを目的とする。

（問題点を解決するための手段）

本発明は、電解中に発生する熱を外部に取り出すための熱交換用パイプが円筒状電解槽の周囲に取付てあり、且つ電解反応により減少する溶液の液面及び電解質濃度を一定に保つための溶媒補充用管が接合されて成る電気分解用反応槽で、白金、パラジウム、金、銀、ニッケルまたはチタンを主体とする金属材料で構成したことを特徴とした電気分解用反応槽であり、その電解反応槽の構成を前記電気分解用反応槽の円筒状電解槽自体を陽極または陰極電極とすることを特徴とする電解反応槽の構成をさせるものである。

以下、本発明を具体的にするために実施例を記載するが、該実施例は本発明を限定するものではない。

（実施例）

第１図は本発明の１実施例である電気分解用反応槽の断面図である。

白金の０．５ｔ厚みの材料で作製した底部１ａを設けてある円筒１（４０φ）に熱交換用パイプ２（６φ）を螺旋状に取付、冷却水等を供給する口２ａと排出する口２ｂを設け、該円筒１の上面にテーパをつけたフランジ１ｂを接合した。

また、該円筒１の上部位置に液面及び電解質濃度を一定に保つための溶媒補給用管３として６φの管を接合したものである。

使用例としては第２図に示すごとく、重水４を電解反応させるために構成したものである。

本発明の電気分解用反応槽５を用い、熱交換用パイプ２には冷却水を流し、溶媒補給用管３より重水を補給できるように接続し、電気分解用反応槽５を陽極とし、陰極はパラジウムの２０φの棒状電極６を用い、該電気分解用反応槽５の上部フランジ１ｂにテフロンパッキン７を介して四口のセパラブルカバー８を接続金具９で固着させた。

なお、セパラブルカバーの四口の一つに蛇管冷却器１０を接合し、他の口には、陰極５のパラジウムに接合した導線１１をシリコンゴムを固定用栓１２として用い、他の２ヵ所の口は測温用の導線１３を同じくシリコンゴム栓１４で固定した。

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上記の構成により、重水４が電解反応により熱を発生しても、熱交換用パイプ２に冷却水を流してあるためただちに冷却され、僅かに蒸発して重水４が減少すると、溶媒補給管３より重水４が補給されるので液面１５が一定に保たれるのである。

なお、電気分解用反応槽５は陽極として用いるため、熱交換用パイプ２に冷却水を供給するには絶縁性のゴム管等を用い、溶媒補給管３と重水４が入ったビン１６の接続はテフロン管１７を用いた。

（発明の効果）

以上の説明で明らなのように、本発明の電気分解用反応槽により、電解反応により発生した熱をただちに外部へ取り出すことができ、しかも液面の変化や電解質濃度の変化に対しては、接続されている補給管より溶媒が適時補給されるため、一定に保たれることと、さらに反応槽自体を陽極または陰極電極として用いることができるため、従来の電極構造とはまったく異なる効果が得られ、極めて応用性の高いものと言える。

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4．図面の簡単な説明

第１図は本発明の電気分解用反応槽の一実施例を示す断面図、第２図は第１図の電気分解用反応槽の使用例を示す断面図である。

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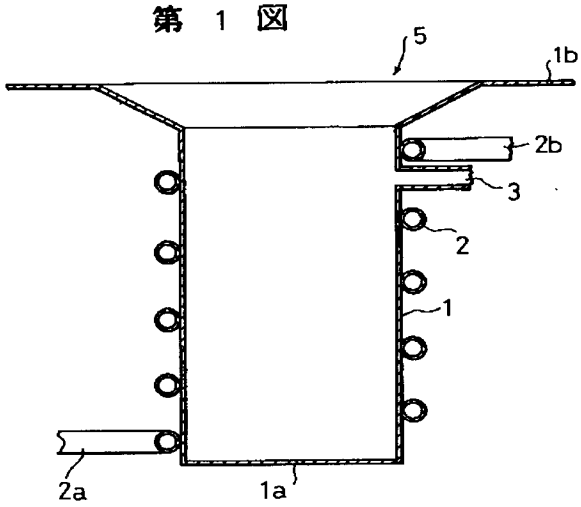
第 1 図



1 … 円筒
2 … 熱交換用パイプ
3 … 溶媒補給用管
5 … 本発明の電気分解用反応槽

第 2 図